

RUSSIAN SETTLEMENT AND LAND RISE IN NORDAUSTLANDET, SPITSBERGEN

Weston Blake, Jr.*

Introduction

DURING the course of the Swedish Glaciological Expedition to Nordaustlandet (North-East Land), Spitsbergen in the summers of 1957 and 1958 the writer devoted particular attention to the morphology and age of the raised beaches that have developed since the coastal areas of the island have become partly deglaciated. When the ruins of a Russian hunting hut on Nordre Russøya, Murchisonfjorden (Figs. 1 and 2) were visited in September 1957 with Prof. G. H. Liljequist and other members of the Swedish-Finnish-Swiss IGY Expedition, it was immediately realized that these ruins could provide valuable information about the rate of land rise, a subject that is currently being discussed for many parts of Spitsbergen (see Feyling-Hanssen 1955a, 1955b; Feyling-Hanssen and Olsson 1959-60; Donner and West 1957; Birkenmajer 1958a, 1958b, 1959, 1960a, 1960b; Jahn 1958, 1959a, 1959b; Büdel 1960; Corbel 1960; Christiansson 1961; and Blake 1961). This site, previously described in detail by Carlheim-Gyllensköld (1900, pp. 164-81) after his visit with the 1898 preparatory expedition for the Swedish-Russian Arc of Meridian Expedition (1899-1902), was therefore revisited in August 1958, at which time a precise levelling was carried out. The present paper is a report on this work.

The lagoon, Russelaguna, on the east side of Søre Russøya was also visited to search for the main Russian settlement. This was reported by Carlheim-Gyllensköld as it had been described to him by a Capt. Pedersen, and was supposedly occupied by a number of hunters for 36 years. As noted by Liljequist (1957, p. 277), however, no remains of this Russian settlement were found. It is most unlikely that all traces of the huts could disappear in such a relatively short time, even though solifluction occurs here and other hunters may have taken away much of the timber (Carlheim-Gyllensköld 1900, p. 169). No bones, wood, bricks, or other artifacts were seen except the ubiquitous reindeer antlers and, judging by the great amounts of bone and other debris lying around the solitary hut on Nordre Russøya, there should have been a very large quantity here. One can only conclude that the settlement was elsewhere or that it never existed.

* Dept. of Geology, The Ohio State University, Columbus, Ohio, and Dept. of Geography, University of Stockholm, Stockholm, Sweden. This article is Contribution No. 1 from the Institute of Polar Studies, The Ohio State University, Columbus, Ohio.

The only other evidence seen of former Russian visits to Murchisonfjorden is the large cross on Krossøya (Figs. 1 and 3), first reported by Nordenskiöld (1863, p. 7) after his visit with Torell's Swedish Expedition to Spitsbergen in 1861.

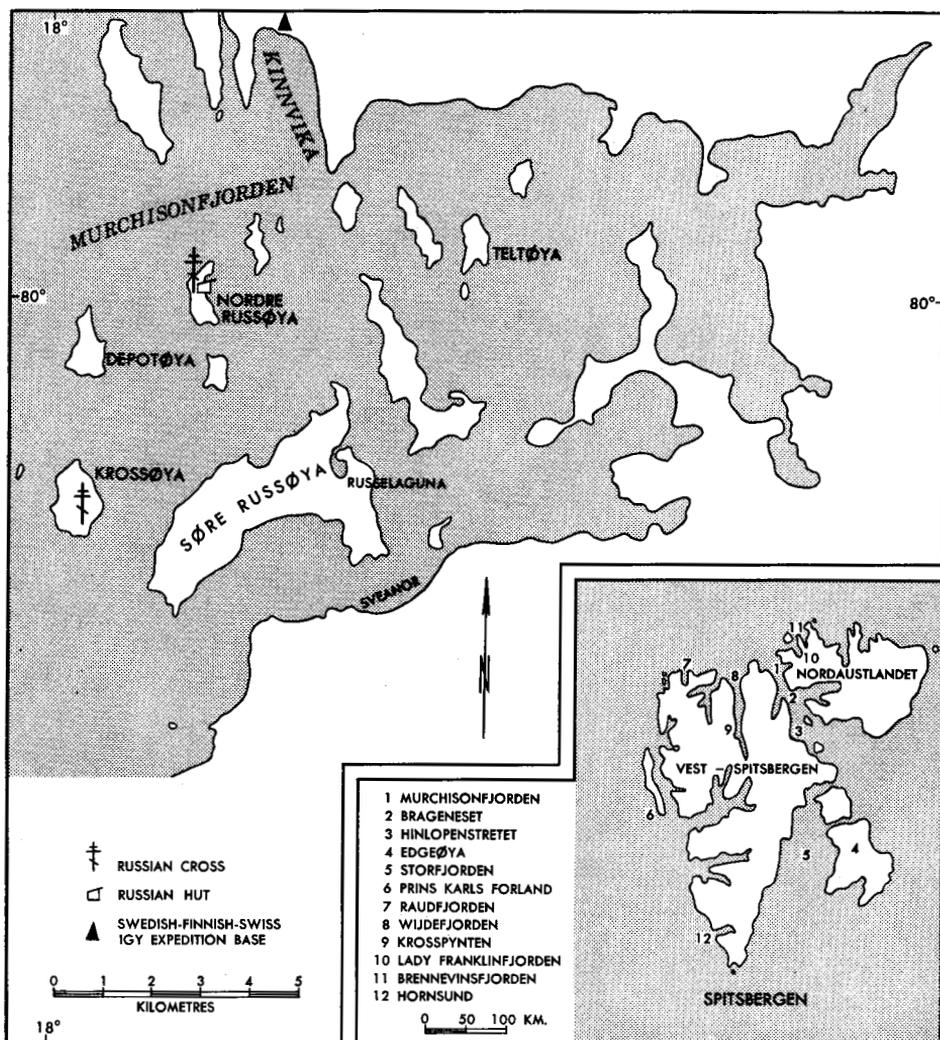


Fig. 1. Murchinsonfjorden, Nordaustlandet, Spitsbergen. (Base map by G. De Geer, 1923).

Levelling results

The hut ruins on Nordre Russøya are situated near the northeast corner of the island about 8 metres from a lagoon, which in turn is separated from the bay by a prominent shingle bar 30 metres wide (Figs. 4 and 5). The

rubble in the middle of the hut is 1.8 metres above mean sea-level, but the general flat area—a beach developed on a thin cover of till overlying dolomite bedrock—around the hut lies at only 1.5 metres. The top of the shingle bar is 1.4 metres above mean sea-level.



Fig. 2. Detail of the Russian hut on Nordre Russøya. View west toward the cross. The hut measures 5 x 5 metres and the remains of the brick fireplace were found in the corner nearest the camera. The C-14 age of the timber indicated by the arrow is 260 ± 100 years.

Tidal observations at the Swedish-Finnish-Swiss IGY base in Kinnvika (July-August 1958), and earlier observations by the Swedish-Norwegian Arctic Expedition (1931) at Sveanor on the south side of Murchisonfjorden and by the Oxford University Arctic Expedition (1935-36) in Brennevinsfjorden (Fjeldstad 1939, p. 372; Hornbæk 1954, pp. 16-7), indicate a mean range of approximately 0.6 metres. Our times of levelling were carefully noted and later were compared with the marigraph records from Kinnvika. In the absence of a *Balanus* line on the beach, the level of the water surface below a small ridge of sand and seaweed left by the preceding high tide was measured, and all altitudes were then corrected to mean sea-level.

Thus the outside of the hut is only 1.2 metres above high-tide level. Furthermore, a line of seaweed on the inner side of the lagoon near the hut

was 0.7 metres above mean sea-level (arrow in Fig. 5). This seaweed indicates the water level at extreme high tides or during storms, and the hut is only 0.8 metres above this level.



Fig. 3. View east at the cross on Krossøya. Note inscriptions in Church Slavonic. The lower oblique crossbar is missing.

History of Russian settlement

The exact time when the hut on Nordre Russøya was built is unknown, but a considerable amount of evidence suggests that it is about 160 years old. According to Conway (1906, pp. 226, 233-4) Zorgdrager reported Russian ships in Spitsbergen waters in 1697, but Zorgdrager, whose book was published in 1720, makes no mention of Russian hunters wintering on the islands. Therefore, their first settlements probably were established sometime between 1720 and 1740, as by 1743 Russians were known to have wintered there for several years. Russian hunting stations were established first on the shores of Storfjorden, particularly Edgeøya, and later on the

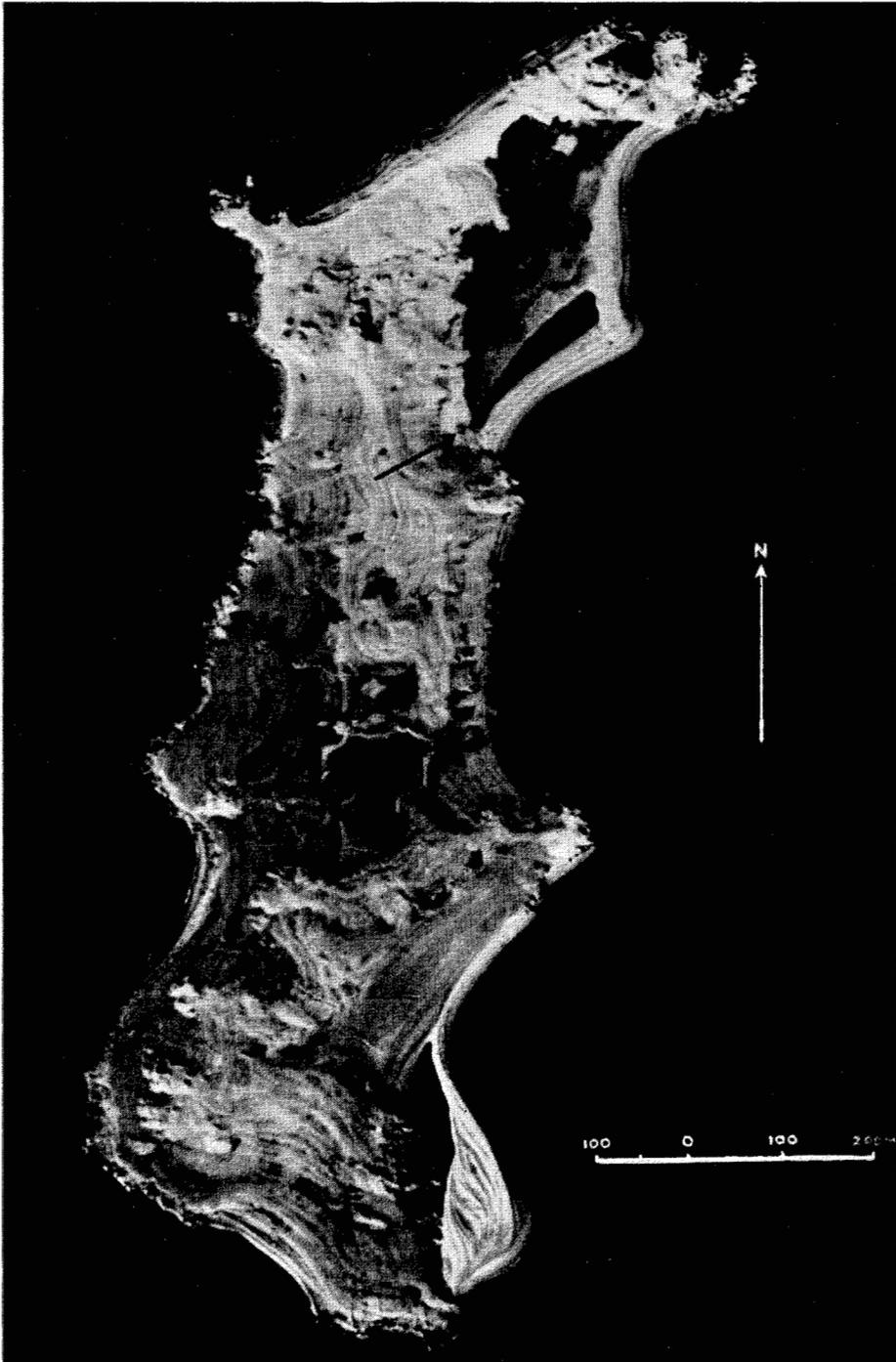


Fig. 4. Air photograph of Nordre Russøya showing the hut site (arrow) and its relation to the lagoon and shingle bar. (Photograph courtesy of the Royal Swedish Air Force, August 1957).

west coast of Vestspitsbergen. The first recorded wintering north of Prins Karls Forland was in 1770-71 (Conway 1906, p. 247), so that the Russians apparently made their way slowly up the west coast looking for new hunting grounds, and then they probably moved eastward along the north coast. In 1934 there was a Russian cross standing at Krosspynten on the west side of Wijdefjorden, and this cross had the date 1792 inscribed on it (Ingstad 1951, facing p. 80). There is no record of a migration up the east coast of Vestspitsbergen, but this may have occurred despite the ice conditions in Hinlopenstretet, which are often more severe than on the west coast.

On the west side of Nordre Russøya a cross still stands that was erected by Russian hunters (Figs. 2 and 6). These large crosses were set up in many places by the hunters, some of whom had been sent out by the monastery on Solovetskie Island in the White Sea. Although no inscriptions are now visible on this cross as a result of the effects of weather, and clawing and gnawing by polar bears, Carlheim-Gyllensköld (1900, p. 170) reported that in 1898 the date 1798 could be faintly seen about 1 metre above the base. Thus, if we discount the possibility that the hunters migrated up the east coast, this cross was almost certainly erected sometime between 1771 and 1798, but probably at the later date. It is very likely that the hut was built at the same time, because the hunters would have needed shelter.

Even if it is assumed, however, that the hut was not built until sometime after the cross was erected, it was standing and in good condition when the island was visited in 1861 (Nordenskiöld 1863, p. 7; Chydenius 1865, p. 164). *The minimum age for the hut, therefore, is 100 years.*

V. V. Frolov, former Director of the Arctic Institute in Leningrad, has stated that to his knowledge there is no record of Russian hunters in Spitsbergen after the 1850's (personal communication, December 1957). The last recorded Russian hunting expedition sailed from Arkhangelsk to Spitsbergen in 1851, wintered at Raudfjorden on the north coast, and left in the summer of 1852 (Erman's Archiv 1854, pp. 261-5; Duner, *et al.* 1867, pp. 101-2). One of the most interesting things in this expedition account, which first appeared in the *St. Petersburger Zeitung* (1853), is that the cargo being loaded on the ship in Arkhangelsk is described, and among the many articles was a quantity of wood for building houses (Erman's Archiv 1854, p. 262). It is evident that the Russians did not rely on finding driftwood, which is so abundant on Spitsbergen shores, but instead brought their own building materials with them.

In order to check the age of the hut a radiocarbon age determination on the outside wood of one of the base timbers was carried out by Dr. Ingrid Olsson at the University of Uppsala C-14 Laboratory. The age of this sample (No. U-37) is 260 ± 100 years (Olsson 1959, p. 91), and, as with all radiocarbon dates, there is a 68 per cent probability that the age of the wood is between the limits of error. To put it in another way, there is a 68 per cent probability that the tree was living sometime between 1600 and 1800, and this does not contradict the historical evidence that the hut was built sometime between 1771 and 1851.

Rate of land rise

Donner and West (1957, p. 17) of the 1955 Oxford University Expedition found driftwood, including some worked wood such as pieces of barrels and part of a boat, at nearly 10 metres above sea-level on the raised beaches of Brageneset, 30 kilometres southeast of Murchisonfjorden (Fig. 1). It should be noted, however, that these pieces of worked wood were not imbedded in the beaches, but were lying loosely on the surface (personal communication from J. J. Donner, August 1959). Donner and West suggested that the worked wood might have come from the 17th century whaling activity around Vestspitsbergen, and if so, it could not be much more than about 350 years old, which would mean that since then the land has been rising at a rate of nearly 3 metres per century in this area. The writer agrees with Donner and West that this would be a surprisingly rapid displacement of the shoreline and suggests that the land rise has been much slower.



Fig. 5. View north at the hut site on Nordre Russøya. The line of seaweed (arrow) on the inner side of the lagoon represents the highest tides and is 0.3 metres above mean sea-level and 0.8 metres below the hut. To the right is the shingle bar.

Driftwood and flotsam from many areas—the tropics, North America, Europe, and Siberia—have long been known in Spitsbergen (e.g., Agardh 1869, pp. 105-19; Nordenskiöld 1874, pp. 39-41; and Ingvarson 1903, pp. 65-8); there is no reason that the worked wood must have come solely from Vestspitsbergen. Furthermore, a possibility exists that some of the worked pieces were carried up by earlier visitors to Brageneset, as Donner and West themselves suggest for a barrel found at 17 metres. In fact Brageneset, or Hyperitön as it was formerly called, is the one other place in Nordaustlandet where a Russian hut once stood (Conway 1897, p. 260; 1906, p. 261).

Pumice, which probably originates in Iceland, has also long been known from raised beaches in Nordaustlandet. Donner and West (1957, p. 22),

however, were the first to show the importance of this pumice for correlating certain beach levels. They traced two horizons of the pumice along Hinlopenstretet and showed that the uplift of the land diminished north-westward from Brageneset. The upper pumice level (13.8 metres at Brageneset) was tentatively thought to be about 500 years old because of its relation to the driftwood. Interpolation from their diagram indicates uplift of the order of 1.5 metres per century at Nordre Russøya.

Recently Birkenmajer, a member of the Polish IGY Spitsbergen Expedition, has suggested in a series of publications that the presence of high-level whale bones, which he believes date from 17th century hunting, indicates relatively rapid uplift. He states (Birkenmajer 1958a, pp. 156-7; 1959, p. 199; 1960a, pp. 76-80) that the 17th-century bones of the Greenland or right whale (*Balaena mysticetus* L.) are found most commonly between 6 and 8 metres above sea-level in Hornsund, southern Vestspitsbergen, whereas the bones at lower altitudes, resulting from 19th century hunting, are those of the finback whale (*Balaenoptera physalus* (L.)) and the white whale (*Delphinapterus leucas* (Pall.)). Using observations on whale bones from a number of localities, Birkenmajer (1958b, p. 548; 1960a, p. 290) has constructed isobases of uplift for the whole of Spitsbergen, and after incorporating Donner and West's data on pumice he postulates an uplift of approximately 1 metre per century in the Nordre Russøya area. However, Jahn (1958, p. 240; 1959a, pp. 261-2; 1959b, pp. 171-6), a member of the same expedition, disagrees with Birkenmajer's results and states that uplift was rapid when the higher raised beaches in Hornsund were forming, but that little or no uplift is now occurring.

The writer has not worked in the Hornsund area, but he is convinced that all the high-level whale bones need not date from the 17th century, particularly those imbedded in the beaches. On the contrary, many are undoubtedly much older and are from whales that have died naturally and been washed ashore. In the innermost part of Lady Franklinfjorden whale bone imbedded in the beach at 17.6 metres has been dated by the Uppsala laboratory at 8530 ± 180 years B.P. (organic fraction, sample No. U-115). Another piece of whale bone, from 7.5 metres in Murchisonfjorden, has been dated at 6380 ± 150 years B.P. (organic fraction, sample No. U-110), and this sample was found with driftwood (No. U-107) dated at 6200 ± 100 years B.P. (Olsson 1960, pp. 117-9). These two samples from Murchisonfjorden show good agreement and both are from the upper pumice level.

Conclusion

The evidence from the Russian hut on Nordre Russøya, which is at least 100 years old and is now only 1.2 metres above high-tide level and 0.8 metres above the highest tides, indicates that land uplift in this area is very slight, if it is occurring at all. An uplift of 1 metre or more per century would mean that this hut would have been under water when it was built! It seems most unlikely that a hut so near to the sea and in such an exposed

location would have been built in the first place if the water had been less than 1.2 metres below the hut site.

No long term observations on land rise are available from this area, but it appears that such a rise is measurable at most in terms of a few centimetres per century, not a metre or two. If a slow isostatic uplift of the land is occurring, it is certainly balanced by the present eustatic rise of sea-level.



Fig. 6. View east at the cross on Nordre Russøya, with the hut site in the distance (arrow).

This has been estimated at about 5 centimetres per century by Thorarinsson (1940, p. 151) on the basis of glacier shrinkage, and at 10 centimetres per century by Gutenberg (1941, pp. 721, 731) from his study of tide-gauge records. In Nordaustlandet, further evidence for the present stability of the shoreline exists in the extraordinarily well-developed shingle beach bars (Fig. 4), which are generally lacking at higher levels on the raised beaches.

Note added in proof: The figures 17.6 and 7.5 metres on page 108 should read 14.9 and 7.6 metres respectively. All other figures of altitude above mean sea-level should be reduced by 0.1.

Acknowledgments

The author is indebted to Rolf Bergström for assistance during the 1958 field season, and to Dr. Ingrid Olsson for carrying out the radiocarbon dating. The Foreign Field Research Program of the Division of Earth Sciences, National Academy of Sciences — National Research Council supported the author's stay in Europe with financial aid provided by the Geography Branch, Office of Naval Research. The Swedish Glaciological Expedition to Nordaustlandet, led by Dr. Valter Schytt of the Dept. of Geography, University of Stockholm, was supported by various government and private organizations in Sweden and Finland, especially the Swedish Natural Science Research Council. The glacial geological work in particular was supported by Svenska Sällskapet för Antropologi och Geografi. The manuscript has been read and useful suggestions offered by Drs. V. Schytt, R. P. Goldthwait, S. E. White, J. J. Donner, H. Christiansson, and Mr. J. Hollin. Sincere thanks are expressed to all these individuals and organizations.

References

- Agardh, I. G. 1869. Om den Spetsbergska drif-vedens ursprung. Öfversigt af Kongl. Svenska Vet.-Akad. Förhandl. 26, No. 2:97-119.
- Anonymous. 1854. Russische Wallrossfänger und Pelzjäger auf Spitzbergen in den Jahren 1851 und 1852. Archiv für wissenschaftliche Kunde von Russland (A. Erman) 13:260-5. (Extract from St. Petersburg Zeitung, 1853).
- Birkenmajer, K. 1958a. Preliminary report on the raised marine features in Hornsund, Vestspitsbergen. Bull. de l'Acad. Polonaise des Sciences, Sér. des sci. chim., géol. et géogr. 6:151-7.
- 1958b. Remarks on the pumice drift, land-uplift and the recent volcanic activity in the Arctic Basin. Bull. de l'Acad. Polonaise des sciences, Sér. des sci. chim., géol. et géogr. 6:545-9.
- 1959. Report on the geological investigations of the Hornsund Area, Vestspitsbergen, in 1958, Part III. The Quaternary Geology. Bull. de l'Acad. Polonaise des Sciences, Sér. des sci. chim., géol. et géogr. 7:197-202.
- 1960a. Recent vertical movements of Spitsbergen. Internat. Geol. Congress, Rept. of the 21st Session, Norden (Copenhagen), Proc. Part 21:281-94.
- 1960b. Raised marine features of the Hornsund area, Vestspitsbergen. Part 2 in Geological Results of the Polish 1957-1958 Spitsbergen Expedition, Studia Geologica Polonica 5:1-95.
- Blake, W., Jr. 1961. Radiocarbon dating of raised beaches in Nordaustlandet, Spitsbergen. in The Geology of the Arctic (Proc. of First Internat. Symposium on Arctic Geology, Calgary, Alberta, January 1960). Toronto: Univ. of Toronto Press, 133-45.
- Büdel, J. 1960. Die Frosthutt-Zone Südost-Spitzbergens. Colloquium Geographicum (Geographisches Institut der Universität Bonn) 6:1-105.
- Carlheim-Gyllensköld, V. 1900. På åttionde breddgraden. Stockholm: A. Bonnier, 256 pp.
- Christiansson, H. 1961. The Russian settlement at Russekeila and land rise in Vestspitsbergen, Arctic 14:112-18.

- Chydenius, K. 1865. Svenska expeditionen till Spetsbergen år 1861. Stockholm: P. A. Norstedt, 480 pp.
- Conway, W. M. 1897. The first crossing of Spitsbergen. London: J. M. Dent, 371 pp.
- 1906. No man's land. Cambridge: University Press, 377 pp.
- Corbel, J. 1960. Le soulèvement des terres autour de la mer de Barentz. *Revue de Géographie de Lyon* 35:253-74.
- De Geer, G. 1923. Missions scientifiques pour la mesure d'un arc de méridien au Spitzberg, entreprises en 1899-1902 sous les auspices des Gouvernements suédois et russe. *Mission suédoise, Tome 2, 9^e section. Topographie. Géologie.* Stockholm: Centraltryckeriet, 36 pp., 5 maps.
- Donner, J. J., and West, R. G. 1957. The Quaternary geology of Brageneset, Nordaustlandet, Spitsbergen. *Norsk Polarinstittut Skr.* 109:1-29.
- Dunér, N., Malmgren, A. J., Nordenskiöld, A. E., and Qvenerstedt, A. 1867. Svenska expeditioner till Spetsbergen och Jan Mayen. Stockholm: P. A. Norstedt, 261 pp.
- Feyling-Hanssen, R. W. 1955a. Stratigraphy of the marine Late-Pleistocene of Billefjorden, Vestspitsbergen. *Norsk Polarinstittut Skr.* 107:1-186.
- 1955b. Late-Pleistocene deposits at Kapp Wijk, Vestspitsbergen. *Norsk Polarinstittut Skr.* 108:1-21.
- Feyling-Hanssen, R. W., and Olsson, Ingrid. 1959-1960. Five radiocarbon datings of post glacial shorelines in central Spitsbergen. *Norsk Geografisk Tidsskr.* 17:122-31. Reprinted with same pagination as *Norsk Polarinstittut Medd.* 86.
- Fjeldstad, J. E. 1939. Results of tidal observations at Brandy Bay, North East Land. *Norsk Geografisk Tidsskr.* 7:369-76.
- Gutenberg, B. 1941. Changes in sea level, postglacial uplift, and mobility of the earth's interior. *Bull. Geol. Soc. Am.* 52:721-72.
- Hornbæk, H. 1954. Tidal observations in the Arctic 1946-52. *Norsk Polarinstittut Skr.* 104:1-17.
- Ingstad, H. 1951. Landet med de kalde kyster. Oslo: Gyldendal, 431 pp.
- Ingvarson, F. 1903. Om drifveden i Norra Ishafvet. *Kongl. Svenska Vet.-Akad. Handl.* 37, No. 1:1-84.
- Jahn, A. 1958. O niektórych badaniach geograficznych polskiej wyprawy naukowej na Spitsbergenie. *Przeglad Geograficzny* 30:223-41. (Summaries in Russian and English).
- 1959a. Postglacjalny rozwój wybrzezy Spitsbergenu. *Czasopismo Geograficzne* 30:245-62. (Summary in English).
- 1959b. The raised shore lines and beaches in Hornsund and the problem of postglacial vertical movements of Spitsbergen. *Przeglad Geograficzny* 31 (Supplement):143-78.
- Liljequist, G. H. 1957. Den svensk-finsk-schweiziska expeditionen till Nordostlandet 1957-58. *Ymer* 77:260-79.
- Nordenskiöld, A. E. 1863. Geografisk och geognostisk beskrifning öfver nordöstra delarne af spetsbergen och Hinlopen Strait. *Kongl. Svenska Vet.-Akad. Handl.* 4, No. 7:1-25.
- 1874. Redogörelse för den svenska polarexpeditionen år 1872-1873. Bihang till *Kongl. Svenska Vet.-Akad. Handl.* 2, No. 18:1-132.
- Olsson, Ingrid. 1959. Uppsala natural radiocarbon measurements I. *Am. J. Sci. Radiocarbon Supp.* 1:87-102.
- 1960. Uppsala natural radiocarbon measurements II. *Am. J. Sci. Radiocarbon Supp.* 2:112-28.
- Thorarinsson, S. 1940. Present glacier shrinkage, and eustatic changes of sea-level. *Geografiska Annaler* 22:131-59. Reprinted with same pagination as *Medd. från Geografiska Institution vid Stockholms Universitet, No. 59.*